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PATENT APPLICATION
Mo4188
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF)
ROLF WIEDERMANN ET AL) GROUP NO.: 1711
SERIAL NUMBER: 08/362,547) EXAMINER: J. M. COONEY
FILED: JANUARY 3, 1995)
TITLE: A PROCESS FOR THE PRODUCTION)
OF RIGID FOAMS CONTAINING)
URETHANE GROUPS AND PRE-)
DOMINANTLY ISOCYANURATE)
GROUPS)

Appeal Brief

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Brief, submitted in triplicate, is an appeal from the Final Office
Action of the Examiner dated February 26, 2003, in which the rejection of Claims 3-9
was maintained.

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Alexandria, VA 22313-1450 7/18/03

Date

N. Denise Brown, Reg. No. 36,097

Name of Appellant, assignee or Registered Representative

N. Denise Brown

Signature
July 18, 2003

Date

I. REAL PARTY IN INTEREST

This application was assigned to Bayer AG by each of the named inventors.

II. RELATED APPEALS AND INTERFERENCES

There are no pending appeals or interferences of which Appellants are aware that would be affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

The above-referenced application was filed with Claims 3-9.

The present application is a RCE, filed on August 29, 2002, of a CPA, filed on September 21, 2001, of the parent application which was filed with Claims 1-8. Claims 1-2 were cancelled in an amendment dated October 18, 1995. Claim 9 was added in an amendment dated October 18, 1995.

Claims 3-9 are pending but stand rejected. Claims 3-9 are the subject claims of this appeal.

IV. STATUS OF AMENDMENTS

Appellants filed no amendments after final rejection.

V. SUMMARY OF THE INVENTION

The present invention is directed to a process for the production of rigid foams containing urethane groups and predominantly isocyanurate groups. (In order to assist the Honorable Board in its evaluation of the invention, reference will be

made to the specification in which "P" will designate a page number and "L" will designate the line number(s)). This process consists of reacting 1) polyisocyanates, with 2) from 30 to 90 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms, having molecular weights of 400 to 10,000 and containing branched chains, in the presence of 3) one or more C₁ to C₆ hydrocarbons as the sole blowing agents, 4) from 10 to 60 parts by weight of flameproofing agents, and 5) from 10 to 20 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms and having molecular weights of 32 to 399 as crosslinking agents, and 6) optionally, auxiliary agents and additives. (See P1, L29 through P2, L30.) Suitable auxiliary agents and additives are selected from the group consisting of emulsifiers, foam stabilizers, catalysts, reaction retarders, cell regulators, pigments dyes, stabilizers against ageing and weathering, plasticizers, fungistatic agents, bacteriostatic agents and fillers. (See P5, L28 through P6, L18.) The parts by weight of components 2), 4) and 5) totals 100 parts by weight, and the reaction is conducted at an isocyanate index of 200 to 600. (See P2, L32-34).

VI. ISSUES

Whether Claims 4, 5, 7, 8 and 9 are unpatentable under 35 U.S.C. 103(a) over the Volkert reference (U.S. Patent 5,096,933).

Whether Claims 3 and 6 are unpatentable under 35 U.S.C. 103(a) over the Volkert reference (U.S. Patent 5,096,933).

VII. GROUPING OF CLAIMS

Claim 4, 5, 7, 8 and 9 are appealed together.

Claims 3 and 6 are appealed together.

VIII. ARGUMENTS

CLAIMS 4, 5, 7, 8 AND 9 ARE NOT RENDERED OBVIOUS BY THE VOLKERT REFERENCE (U.S. PATENT 5,096,933).

It is respectfully submitted that the presently claimed invention is not rendered obvious by the Volkert reference. The presently claimed process for the production of rigid foams requires C₁ to C₆ hydrocarbons as the sole blowing agents.

Blowing agents disclosed by the Volkert reference include (d) cyclopentane (d1), or mixtures (d2) comprising (i) cyclopentane and/or cyclohexane, and (ii) at least one compound homogeneously miscible with cyclopentane and/or cyclohexane, preferably having a boiling point below 35°C, and are being selected from the group consisting of alkanes, cycloalkanes having a maximum of 4 carbon atoms, dialkylethers, cycloalkylene ethers and fluoroalkanes, and may be optionally combined with water. A more complete description of suitable blowing agents is set forth at column 8, line 52 through column 9, line 40 of the Volkert reference.

This reference also discloses that these blowing agents can be used in combination with water (see column 8, line 67 through column 9, line 1). The preferred blowing agents of the Volkert reference include a combination of cyclopentane and water; a combination of cyclopentane and/or cyclohexane, and water; a combination of cyclopentane and/or cyclohexane, water, and one or more low boiling alkanes (see column 9, lines 2-8). These specifically preferred combinations of blowing agents are described in detail with regard to the specific blends of various parts by weight at column 9, lines 21-40 as determined by the boiling point of the mixture and the low thermal conductivity of the rigid PU foam to be prepared.

Appellants respectfully submit that the present claim language clearly excludes water and other compounds such as the dialkylethers, cycloalkylene ethers and the fluorinated alkanes. These compounds are outside the scope of the presently claimed invention.

Although the disclosure of the Volkert reference is broad enough to encompass only cyclopentane as the sole blowing agent, as well as mixtures of

cyclopentane and/or cyclohexane and a low boiling compound which is homogeneously miscible with cyclopentane and/or cyclohexane and which preferably has a boiling point of less than 35°C, none of the working examples of this reference use cyclopentane and/or cyclohexane alone, or any other hydrocarbon having from 1 to 6 carbon atoms! All five (5) examples of the Volkert reference use water as a blowing agent in addition to cyclopentane, or with a combination of cyclopentane or cyclohexane and at least one other compound.

In particular, Example 1 uses 3.6 pbw of water and 10.9 pbw of cyclopentane. Example 2 uses 2.0 pbw of water and 14.1 pbw of a mixture comprising 13.5 pbw of cyclohexane and 0.6 pbw of heptafluoropropane. Example 3 uses 3.5 pbw of water and 12.0 pbw of a mixture comprising 8 pbw of cyclopentane and 4 pbw of diethylether. In Example 4, 3.0 pbw of water and 11.0 pbw of a mixture comprising 8 pbw of cyclopentane and 3 pbw of isobutane are used. Example 5 uses 1.8 pbw of water and 16.0 pbw of a mixture comprising 15 pbw of cyclohexane and 1 pbw of tetrafluoroethane.

Appellants respectfully submit that the express claim language of the presently appealed claims clearly excludes the presence of water. In addition, water is known to cause surface brittleness in foams due to the reaction between the isocyanate and water which results in the elimination of carbon dioxide. This adversely effects the adhesion between the foam and the surface skin. (See P1, L5-11.) Therefore, one of ordinary skill in the art would expect the foams produced in the working examples of the Volkert reference to exhibit surface brittleness.

It is respectfully submitted that this reference simply does not provide sufficient guidance or information to the skilled artisan such that one could reasonably expect to produce a rigid foam that is flame resistant and dimensionally stable while being free of surface brittleness from the presently claimed combination of components at the presently required isocyanate index (i.e. 200 to 600). The skilled artisan would simply not expect that the presently required combination of components which includes one or more C₁ to C₆ hydrocarbons as the sole blowing

agents when reacted at the isocyanate index of 200 to 600 would result in rigid foams which are flame resistant, dimensionally stable and free of surface brittleness.

The previously submitted declaration of Dr. Friederichs submitted by Appellants with the response dated July 31, 2002 supports Appellants' position. This declaration illustrates that simply modifying the Volkert reference by (1) omitting water and other blowing agents which are outside the scope of the present claim language, and (2) increasing the Isocyanate Index of these examples that the presently required range does not result in rigid foams which are flame resistant and dimensionally stable without surface brittleness. This particular combination of properties is only achieved from the presently claimed combination of components.

The examples of Dr. Friederichs declaration are all comparison examples. Example 1 is a repeat of Example 1 of U.S. Patent 5,096,933 (the Volkert reference). This example shows that this foam is dimensionally stable but has a brittle surface. Example 2 illustrates the error of the Examiner's logic in concluding that one can arrive at the presently claimed invention by simply omitting the water from the formulations. The foam produced in Example 2 of the declaration has the same density as the foam from Example 1 therein, but it also exhibits strong shrinkage and lacks dimensional stability.

Example 3 of the declaration shows that omitting water while increasing the isocyanate index and adding a trimerization catalyst does not result in a satisfactory foam. Rather, this foam has the same density as the foams produced in Examples 1 and 2, is dimensionally stable, but exhibits surface brittleness. It is apparent from this example that omitting water, increasing the NCO index and adding a trimerization catalyst does not result in the presently claimed invention. This example illustrates the need for 10 to 20 parts by weight of compounds containing at least two isocyanate-reactive hydrogen atoms and having molecular weights of 32 to 399. Although the Volkert reference broadly discloses that such compounds may be present (see column 8, lines 3-41, none of the working examples uses such a compound).

The last example of the declaration, Example 4, also omits water from the formulation, while increasing the Isocyanate Index (from 114 as in Example 1 to Mo4188

500), and includes a trimerization catalyst. A crosslinking agent was not included in this formulation. As in Example 3, this example resulted in a foam which has a density similar to Example 1 and is dimensionally stable, but extremely brittle. This example also supports Appellants position that the presently required combination of components and the respective quantities of the components is essential to produce rigid foams which are dimensionally stable but not brittle on the surface.

Dr. Friederichs' declaration provides sufficient evidence to rebut the presumption that omitting water while increasing the isocyanate index of the formulations of the Volkert reference will "obviously" result in foams which are dimensionally stable and free of surface brittleness. This presumption is clearly incorrect! There is simply insufficient information provided by the Volkert reference which suggests how to achieve this unique combination of properties simultaneously. Appellants respectfully submit that only from the presently required combination of components in the presently required quantities, with the use of C₁ to C₆ hydrocarbons as the sole blowing agents, can these two properties be attained simultaneously.

One of ordinary skill in the art has no insight into the uniqueness of the presently claimed invention upon reading the Volkert reference. Only after reading the present specification does it become "obvious" how to proceed. Such a perspective does not, however, provide a proper basis for a rejection under 35 U.S.C. 103. Therefore, Appellants respectfully submit that the presently claimed invention is not fairly suggested by the Volkert reference.

Appellants respectfully request that this rejection be withdrawn and Claims 4, 5, 7, 8 and 9 be allowed.

CLAIMS 3 AND 6 ARE NOT RENDERED OBVIOUS BY THE VOLKERT REFERENCE (U.S. PATENT 5,096,933).

Appellants respectfully submit that the presently claimed invention is not obvious to one of ordinary skill in the art upon reading the Volkert reference.

The present invention is broadly directed to a process for the production of rigid foams wherein C₁ to C₆ hydrocarbons are the sole blowing

agents. More specifically, Claim 3 requires pentane as the sole blowing agent, and Claim 6 requires hexane as the sole blowing agent.

As set forth above, the Volkert reference discloses suitable blowing agents as (d) cyclopentane (d1), or mixtures (d2) comprising (i) cyclopentane and/or cyclohexane, and (ii) at least one compound homogeneously miscible with cyclopentane and/or cyclohexane, and preferably having a boiling point below 35°C, and being selected from the group consisting of alkanes, cycloalkanes having a maximum of 4 carbon atoms, dialkylethers, cycloalkylene ethers and fluoroalkanes, and may be optionally combined with water. A more detailed description is provided at column 8, line 52 through column 9, line 40.

In addition to the reasons as set forth above, the only alkanes specifically disclosed by the Volkert reference are propane, butane and isobutane (see column 8, lines 58-59; and column 9, lines 5-6). Boiling points of these three (3) alkanes are -42.5°C, -0.5°C and -11.73°C, respectively. These three alkanes clearly have boiling points less than the 35°C recommended as the maximum.


By comparison, the presently claimed alkanes, i.e. pentane and hexane, have boiling points greater than 35°C. More specifically, pentane has a boiling point of about 36.1°C, and hexane has a boiling point of about 68.7°C.

Appellants respectfully submit that the presently claimed alkanes are clearly not suggested by the Volkert reference. In fact, one of ordinary skill in the art would believe that alkanes alone, such as pentane and hexane, are not suitable blowing agents for preparing rigid foams. The Volkert reference clearly leads the skilled artisan to conclude that cycloalkanes such as cyclopentane and/or cyclohexane are suitable alone or in combination with other hydrocarbons such as low boiling alkanes, but higher boiling alkanes, such as pentane and hexane, are not suitable blowing agents.

The Volkert reference simply does not suggest the presently claimed invention to one of ordinary skill in the art. Accordingly, Appellants respectfully request that this rejection be withdrawn and Claims 3 and 6 be allowed.

Appellants therefore submit that each of the Examiner's rejections is in error and respectfully request that the rejections be reversed and that Claims 3-9 be allowed.

Respectfully submitted,

By 
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